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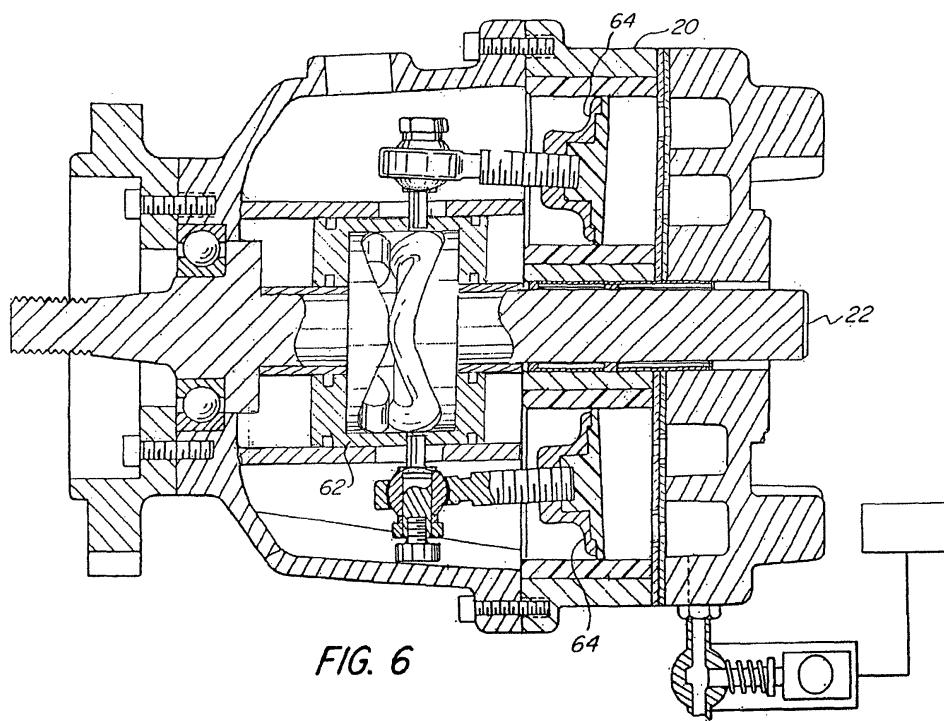
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### (54) Reciprocating axial displacement device

(57) A reciprocating axial displacement mechanism is disclosed generally comprising a housing, a rotating device, a displacement device having first and second undulating surfaces disposed in the housing, and a cam connected to the rotating device and disposed between the first and second undulating surfaces. The cam either has an undulating shape or has first and second undu-

lating surfaces such that, as the cam rotates with the rotating device, the cam slides along the first and second undulating surfaces of the displacement device to cause the displacement device to move back and forth along the longitudinal axis of the rotating device. In certain embodiments, the displacement device is a pumping device, or an actuator for a pumping device, in a compressor.





DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	DE 29 02 025 B1 (WOLF ANTON) 3 July 1980 (1980-07-03) * column 3, line 25 - column 9, line 3; figures 1-8 *	1,3,5	INV. F04B35/01 F04B27/10 F16H25/12
X	FR 733 873 A (RONSSE, HENRI-DESIRE-ROCH-AUGUSTE) 12 October 1932 (1932-10-12) * page 1, line 49 - page 2, line 73; figures 1-7 *	1,5-7	
X	FR 2 269 001 A (ETIENNE CHARLES [FR]) 21 November 1975 (1975-11-21) * page 2, line 8 - page 4, line 19; figures 1-4 *	1	
X	DE 596 920 C (HIMMELWERK AG) 12 May 1934 (1934-05-12) * page 1, line 41 - page 2, line 24; figure 1 *	1	
X	WO 99/53222 A (SCHALLER PAVEL [CZ]; BANDAS JAROSLAV [CZ]) 21 October 1999 (1999-10-21) * pages 4-9; figures 1-10 *	1,7	TECHNICAL FIELDS SEARCHED (IPC)
A	GB 462 666 A (EMILE DIRIX) 9 March 1937 (1937-03-09) * page 1, line 67 - page 3, line 5; figures 1-5 *	1-17	F16H
A	FR 370 319 A (PENSO, JOHN ANTHONY) 4 February 1907 (1907-02-04) * page 1, line 51 - page 2, line 38; figures 1-5 *	1-17	
		-/-	
The present search report has been drawn up for all claims			
2	Place of search Munich	Date of completion of the search 5 October 2007	Examiner Lord, Gareth
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document			



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	EP 0 320 171 A (WILCOX KEVIN [GB]; HOPPER ALAN INGLEDEW [GB]) 14 June 1989 (1989-06-14) * abstract * -----	1-17	
A	EP 0 120 147 A (TEN HOLDER JOHANNES HENRICUS M) 3 October 1984 (1984-10-03) * abstract * -----	1-17	
			TECHNICAL FIELDS SEARCHED (IPC)
2	The present search report has been drawn up for all claims		
	Place of search	Date of completion of the search	Examiner
	Munich	5 October 2007	Lord, Gareth
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	
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ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 05 01 9722

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

05-10-2007

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
DE 2902025	B1	03-07-1980	NONE		
FR 733873	A	12-10-1932	NONE		
FR 2269001	A	21-11-1975	NONE		
DE 596920	C	12-05-1934	NONE		
WO 9953222	A	21-10-1999	AU 8726798 A CZ 9801128 A3		01-11-1999 17-11-1999
GB 462666	A	09-03-1937	NONE		
FR 370319	A		NONE		
EP 0320171	A	14-06-1989	GB 2213549 A JP 1237301 A		16-08-1989 21-09-1989
EP 0120147	A	03-10-1984	NONE		